

**Theme:** Features.

Based on: Hayes, 2009, chapter 4.

### 1. The cognitive turn: biological and computational aspect

Aim: cracking the software code in the mind/brain + writing code for artificial intelligence.

Programming: data structure + commands + general architecture.

Phonological theory: representation + manipulation of rep. + general architecture.

Underlying form/representation → surface form/representation.

(Cf. \* form in proto-language > form in documented language.)

Transformational approach with mappings and (rewrite) rules, focusing on processes  
vs. declarative approach with constraints, focusing on representations.

(NB: OT is tricky...)

Q: Are these rules and constraints just a fancy way to describe observed facts? Or do they explain facts?

### 2. Why have fewer segments in the underlying form than in the surface form?

[ˈmaɪɡɹ̥wənts] vs. [ˈmɛtəfɔɹ]

Structuralist approach: [ɹ] and [ɹ<sup>w</sup>] are allophones of phoneme /XC31/ (a.k.a. /R/ or /r/ or /ɹ/ or /ɹ<sup>w</sup>/).

Generative approach: The lexicon contains the form, the meaning and the syntactic properties (e.g., part of speech, subcat frame, etc.) of each lexical item. How do the forms of items *migrant* and *metaphor* appear in the lexicon?

Option 1: /maɪɡɹ̥wənts/                      /mɛtəfɔɹ/                      No need for rules (except stress)

Option 2: /maɪɡɹ̥wənts/                      /mɛtəfɔɹ<sup>w</sup>/                      + de-labialization rule

Option 3: /maɪɡɹ̥ənts/                      /mɛtəfɔɹ/                      + labialization rule

Which one to choose?

- Tradition going back to the structuralist notion of a phoneme system
- The psychological reality of phonemes: native speakers only conscious of underlying segments.
- Economical lexicon: use as small an alphabet as possible.
- Predict observable patterns, generalizable regularities. (*That's the goal of phonology, after all...*)
- Morpho-phonology: changes taking place during inflectional paradigms, derivation, compounding, or even across word boundaries (within a syntactic phrase, or even not).
- ...?

*Are these reasons for supposing a restricted alphabet + rules in the mental lexicon in our mind/brain?*

### 3. Rewrite rules      $A \rightarrow B / C\_D$

That's a context sensitive rewrite rule on formal language theory:  $CAD \rightarrow CBD$ .

Is phonology a context sensitive phenomenon in Chomsky's hierarchy?

(Note the non-context sensitive rule on Hayes, p. 101, fn. 9.)

Optional (or probabilistic) rule application for free variation (esp. within a single idiolect/register).

A, B, C and D can each be  $\emptyset$ : insertion (a.k.a. *epenthesis*), deletion, insensitive to left/right context.

Vacuous application: no change happens, input = output (esp. if underspecified feature matrices, as below)

Rewrite rules in SPE phonology: A, B, C and D are (theoretically) **feature matrices**.

### 4. Features

Natural classes = larger categories than segments: segments that are "similar" and behave "similarly".

Features = smaller units than segments: "building blocks" of segments.

Two logical directions:

*(Sorry if your textbook seems to be inconsistent. Its inconsistency reflects contemporary phonology...)*

(Articulatory) phonetic features  $\rightarrow$  natural classes  $\rightarrow$  prediction on phonological behavior.

Observed phonological behavior  $\rightarrow$  natural classes  $\rightarrow$  phonological features.

Features are the building blocks of "Phonological Theory X", and presumed to be universal. Are they?

Arguing for features:

- Based on observing similarly behaving classes of segments in phonological processes (in a single language? in a few/several/many languages? in all languages of the world?)

Tentative definitions of features:

- Based on articulatory features (but sometimes blurring the boundaries...)
- Based on (objective) acoustic and/or (subjective) perceptive traits (well, often quite vague...)

Should *phonological* features reflect/be based on *phonetics* (articulation, acoustics and/or perception)?

Or should they be abstract notions, reflecting the data structures of the mental software, and independent of what happens in the speech organs and in the hearing organs? Depends on theoretical stance!

Rewrite rules in SPE phonology:

A, B, C and D are (theoretically) **feature matrices**. How to interpret a rule? (Hayes, pp. 72-73)

1. Rule applies to any uninterrupted sequence of segments (substring) that matches the *partial* feature matrix sequence CAD.
2. Within the matrix of the segment that matches A, change the value of the features appearing in B to the corresponding values.

**Value** of a feature: in SPE-phonology, postulated to be **binary**. What does such a theory predict?

Zero as feature value? (1) do not allow it; (2) *underspecification*; (3) indeed, tertiary system.

**Underspecification**: no value specified (esp. in underlying form); yet, no rule can refer to this fact.

**Reading for Thursday**: Kenstowicz, chapter 2.

**Question for Thursday**: "Elegancy" as a meta-theoretical principle: how do you understand it?

Hayes, p. 57: "in principle, we want to know not just a convenient and elegant way to symbolize Mandarin sounds, but the way that actually is found in the internalized grammars of native speakers."

Hayes, p. 93: "this flies in the face of our earlier principle that phonological rules make reference to natural classes; certainly a more elegant approach would be to adopt a single rule..."